

REMARKS

The following remarks are submitted in light of the telephonic Examiner Interview conducted on 9 January 2007 and Office Action dated 22 September 2006. Claims 1, 4-5, 13, and 15 are presented for examination of which Claims 1 and 13 are the only independent claims. Claims 6-12 and 16-20 stand withdrawn. Support for the amendments to Claims 1 and 13 can be found the patent application as originally filed. More specifically, the amendment (1) "because said copper source of said impure copper seed layer is equivalent to said copper source of the impure" can be found in Claim 2 as originally filed, (2) "however some impurities in the impure copper fill are absent from the impure copper seed layer" can be found in ¶24, lines 16-19 of page 7 of the specification, and (3) "wherein said impurity content comprises not more than 1.20% by weight and not less than or equal to 0.0001% by weight" can be found in Claim 3 as originally filed. No new matter has been added.

EXAMINER INTERVIEW

Applicants gratefully acknowledge the courtesies extended by the Examiner during the Examiner Interview on 9 January 2007. The Andricacos patent and Claim 1 were discussed during the Examiner Interview. Applicants explained that Andricacos fails to teach, suggest, or disclose (1) an impure copper seed and (2) material composition of said seed layer is substantially the same as material composition of said impure copper fill. The Examiner contended the language "substantially the same" was unduly broad. Applicants agreed to amend Claim 1 to include Claim 3 limitations which limits the breadth of Claim 1. Applicants further discussed the Examiner's comment in the Advisory Action that stated that the "Applicant does not explicitly say that the material

composition of both the copper seed layer and the impure copper fill are identical.”

Applicants explained that the reason that the material is not identical is because deposition of the seed layer alters the impurity content of the seed layer.

RESPONSE TO OFFICE ACTION 9-22-7

The claimed invention requires an impure copper seed layer. The source for the seed is equivalent to the source for the copper fill. Because the source for the seed is equivalent to the source for the copper fill, the material composition of the seed and the fill is substantially the same. That said, the material composition of the seed is not identical to the fill because the process of deposition of the seed causes some impurities to be absent from the seed, although those same impurities remain in the fill. One benefit of the claimed invention is that interconnect edge erosion is reduced. Another benefit of the claimed invention is that dendritic formation is reduced.

Andricacos fails to disclose, teach, or suggest an impure copper seed layer. Any reference to seed layer 5 in Andricacos is to a copper, Cu, seed layer. (See e.g. Andricacos, col. 4, lines 57-58, col. 9, line – 40 – col. 10, line 10). Further, Andricacos does not disclose the source of the seed, or more particularly that the source of the seed is equivalent to the source of the fill. Andricacos further does not disclose an impurity content of not more than 1.20% by weight and not less than or equal to 0.001% by weight. Andricacos also does not disclose that some of the impurities in the fill are absent from the impure copper seed layer as a consequence of deposition of the seed layer. Therefore, Andricacos does not disclose all the elements of the claimed invention. For at least these reasons, Andricacos does not disclose, teach or suggest the claimed invention.

Further, there is no motivation in Andricacos to combine the features of an impure copper seed layer, or source of the seed that is equivalent to the fill, or that certain impurities are absent in the seed layer, which are included as part of the claimed invention. There is no evidence in Andricacos that the claimed seed layer would solve the void and seam problem in the Andricacos fill. Further, in consideration that the void and seam problem in Andricacos is located in the fill, and no reference in Andricacos teaches that modification of the seed layer would fix the void and seam problem located in the fill, one of ordinary skill in the art would not be motivated to consider the claimed seed layer as a solution for the voids and seams located in a different part of the interconnect, and more specifically located in the fill. For this further reason, Applicants contend that there is no motivation to modify Andricacos with the claimed invention, and therefore the obviousness rejection applied against the claims should be withdrawn.

Therefore, Applicants respectfully submit that Claims 1 and 13 are in condition for allowance and request withdrawal of the claim rejection applied against Claims 1 and 13, as well as the dependent claims. The dependent claims are allowable, Applicants respectfully submit, because of their dependence on allowable base claims.

CONCLUSION

Reconsideration and allowance of the pending claims is respectfully requested.

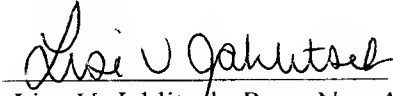
If the Examiner has any questions or believes further discussion will aid examination and advance prosecution of the application, a telephone call to the undersigned is invited.

No fee is believed to be due for the submission of this amendment. If any fees

are required, however, the Commissioner is authorized to charge such fees to Deposit Account No. 09-0458.

Respectfully Submitted,

Kevin Petrarca, et al.

A handwritten signature in cursive script, appearing to read "Lisa U. Jaklitsch", is written over a horizontal line.

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